ESA GMES Services Evolution Study Contract

ESA ref: 19971/06/I-EC

GSE Collocation, ESRIN 6th to 8th March, 2007

Presented by:

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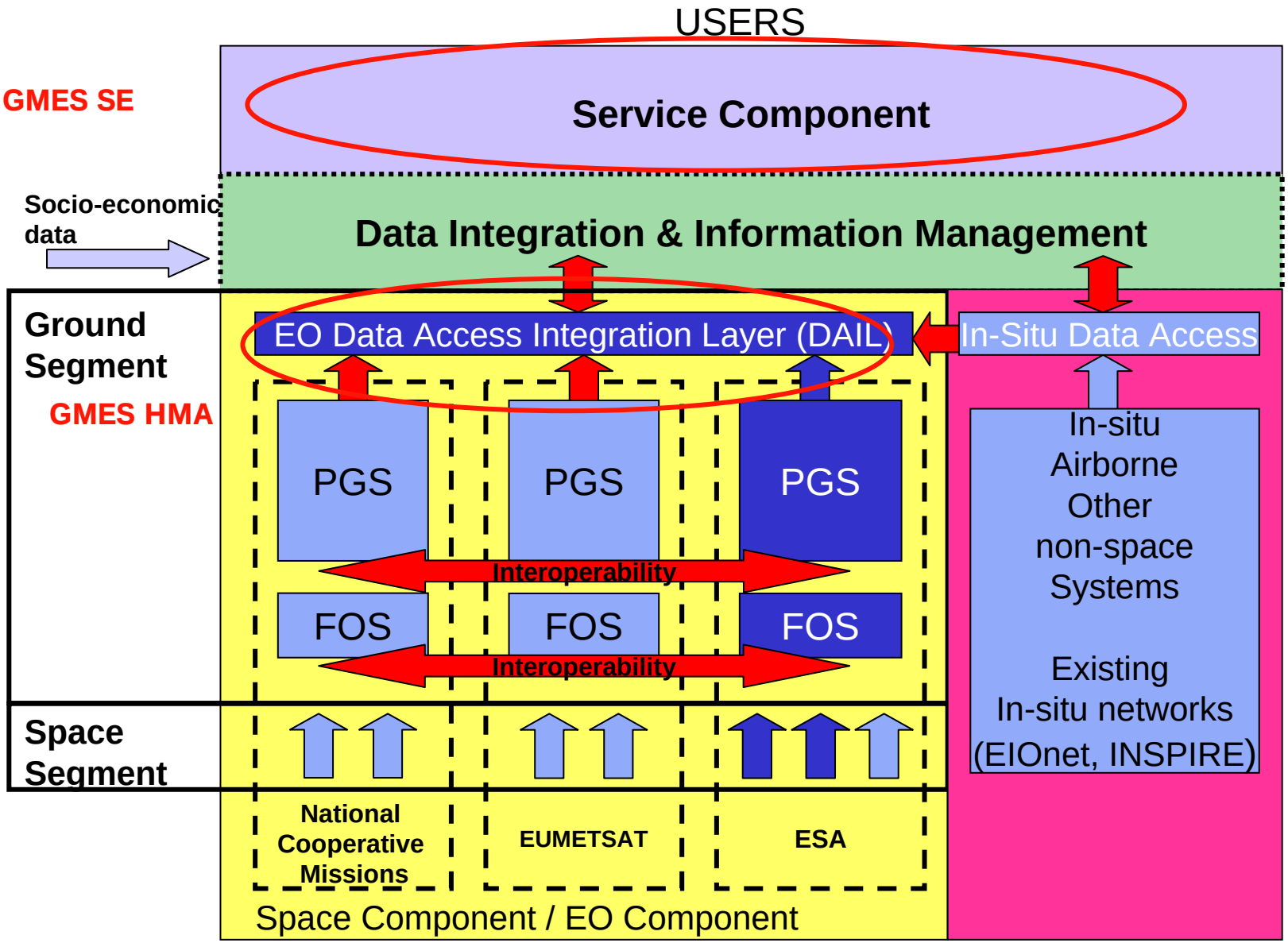
Background

- Analysis of Services Evolution in the mid-term period (2008 – 2015)
- Part of the GMES Preparatory Activities
- The overall aim of this work is to analyse the evolution of GMES services over the next decade, assess the requirements arising from this evolution and formulate designs for operational implementation of service production, delivery and use
- The prime objective is to provide answers to the following questions:
  - What is the full portfolio of GMES services in 2015 and who are they delivered to?
  - How can operational delivery and use of GMES services be organised?
  - What are the key steps and required developments to progressively roll-out GMES services ?

GMES Architecture



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Key Objectives

- provide a concrete, robustly defined assessment of what infrastructure is needed to navigate from the current landscape into one suitable for providing the priority services emerging from the EC in 2008 – Fast Track Services
- provide a strategic, forward thinking assessment of the potential range of services that GMES could expand to supply in 2015
- to provide an assessment of the changes to organisational structures and infrastructure necessary to realise the 2015 portfolio.

Practical Objectives

- Review & analyse services currently under development (GSE, EC FP6, FTS, MS national),
- Define initial implementation designs of operational service production, delivery & use for 4 specific service portfolios based on current capabilities,
- Explore additional dimensions of GMES (beyond environment) that may have significant impact on the evolution of GMES services in the mid-term (2008-2015),
- Formulate a complete, coherent and consolidated vision of how the full range of GMES services may evolve to operational status on a sustainable basis in the timeframe of 2008 – 2015.

Specific Issues Addressed

- Evolution of services building from the current governmental environmental focus
- “Concrete” architectural options using recognised state of the art industrial design methodologies and technologies
- Use of established infrastructure and procedures rather than a clean-sheet design
- Integration of in-situ data, models and assimilation to create valuable information (nowcasting -> forecasting)

Main Tasks & Logic

1. Review current GMES services capabilities & status

Briefing Pack on GMES

2. Derive initial implementation designs for 4 specific services

- Civilian Risk
- Land Cover Monitoring
- Marine & Coastal Monitoring
- Humanitarian Aid

3. Bring New Perspectives

Global Change | Citizen | Industry | Strategic | Security | Technology

Dossiers : issues & implications for GMES services

4. Consolidate GMES Future Vision

- 2015 Services Portfolio
- Services segment Operational scenarios
- Services Architecture & Implementation requirements
- Implementation Action Plan
- Services Roll-out Road Map

Organisation and Study Logic

Task 1

Produce "fast" summary of GMES

Task 2

Manage 6 "expert groups" to provide vision for GMES portfolio 2015

Task 1+

Iterate Task 1 outputs
Briefing Pack
GMES Organisation

Task 3

Study the architectural requirements for the GMES "Fast Track" services

Specify detailed "Concrete" Architectures

Task 4

Propose

2015 portfolio &

operational Scenarios

Task 5

Specify High level Architectures for 2015 services

Tasks 6 & 7

Produce Plan and Roadmap for Delivery

"GMES Blue Print"

Task 8

Communications materials for Citizen and Directors

Phase 1

Phase 2

Phase 3

2 months

6 months

5 months

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GMES Services Thematic Domains Focus on EC Fast Track

Services Segment	Associated ESA GSE Stage2	Associated ESA GSE Stage1	Associated EC GMES IP	Associated GMES Core Service
Land Cover Monitoring	GSE LAND FOREST GMFS	SAGE URBAN (GUS) FOREST	GEOLAND	LAND
Marine & Coastal Monitoring	MARCOAST MARISS POLAR VIEW	ROSES COASTWATCH ICEMON NORTHERN VIEW	MERSEA	MARINE
Civilian Risk Management	RISK-EOS TERRAFIRMA MARISS	RISK-EOS TERRAFIRMA	PREVIEW LIMES	EMERGENCY RESPONSE
Humanitarian Aid	RESPOND	RESPOND	LIMES	EMERGENCY RESPONSE

Thread 1: Future GMES portfolio

- Existing Situation: generate “status” report on current and projected GMES capabilities, Initial Services – use to brief people who have never heard of GMES.
- New Perspectives: Assemble 6 small groups (2-3 people) who are recognised experts in the following areas:
  - Climate Change / Global Change – turning now casting into forecasting
  - Security – peace keeping and defence
  - Services to the Citizen - that they would use – like weather forecasts….
  - Geoinformation Services – information that business would use
  - Geo – political; what is going to be the issue that drives Europe in 10 years time…?
  - Technology: what enabling technologies will make GMES services possible?
- Brief experts on what GMES is
- Experts produce a short dossier on implications for GMES in their domain. Dossier includes:
  - What is stopping GMES like services from being used in this sector today?
  - What services could be possible?
  - What needs to change to make it happen (technically, politically etc)
- Consolidate and synthesise outputs using any other input documents that are useful – e.g. Uk MOD “Dimensions” papers
- Produce a a promotable “Evolution Statement”
- Provide presentation materials

Thread 2: SERVICE Architectures

End 2 End downstream infrastructure assessment and design

- Not covering the full GMES portfolio
- Will cover the following areas that broadly match the EC “Fast Track Services” (now known as “core services”)
  - Land cover
  - Civilian Risk (ie inside Europe)
  - Humanitarian Aid (Outside Europe)
  - Coastal Monitoring

- Information gathering stage, from ESA / EC projects and other sources
- Include users current delivery systems and in-situ data needs
- Uses strict design languages and methodologies to model the data flows and propose architectures.
- Service Oriented Architecture (SOA) approach, probably UML based. Reference architecture to identify the Potential *Software Services* within the GMES Service Segment
  - Boundaries between Organisations (Enterprises)
  - Potential Distribution of functions between Organisations
  - Information Exchanged at these exposed Interfaces

- Starting point is current systems, not a blank sheet of paper.
- Consolidate and synthesise outputs
- Provide presentation materials

Architectural Vision for GMES Service Delivery

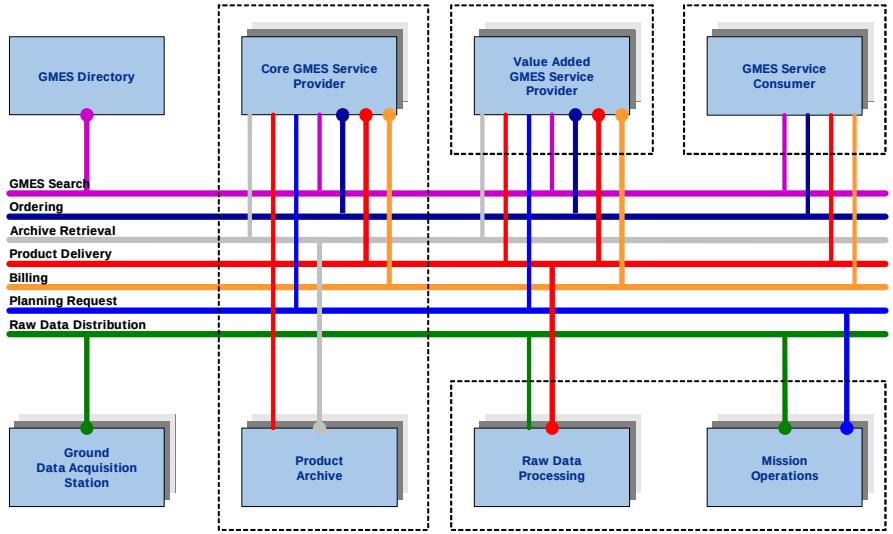
Objective:

Architectural framework for the delivery of GMES services

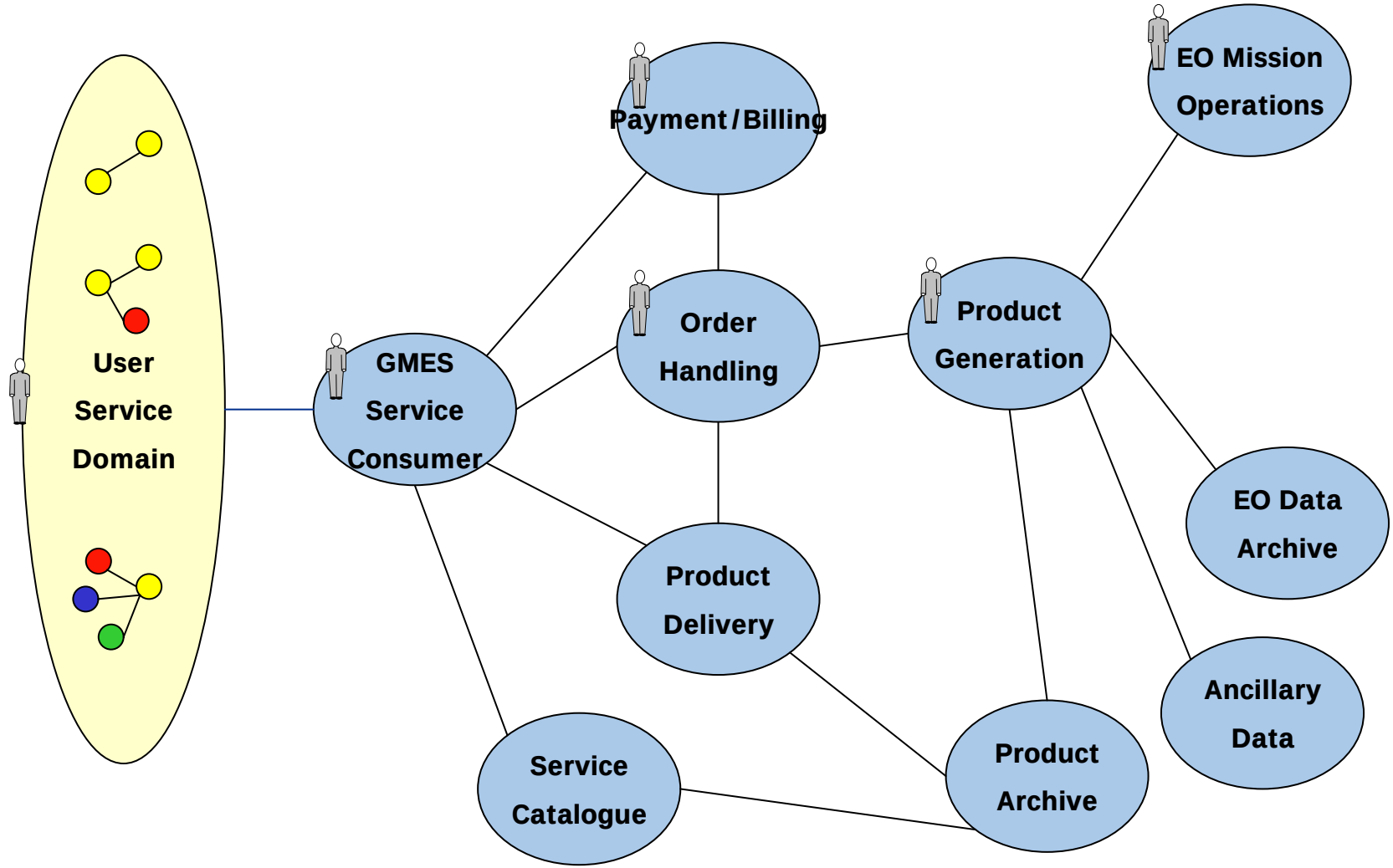
Vision:

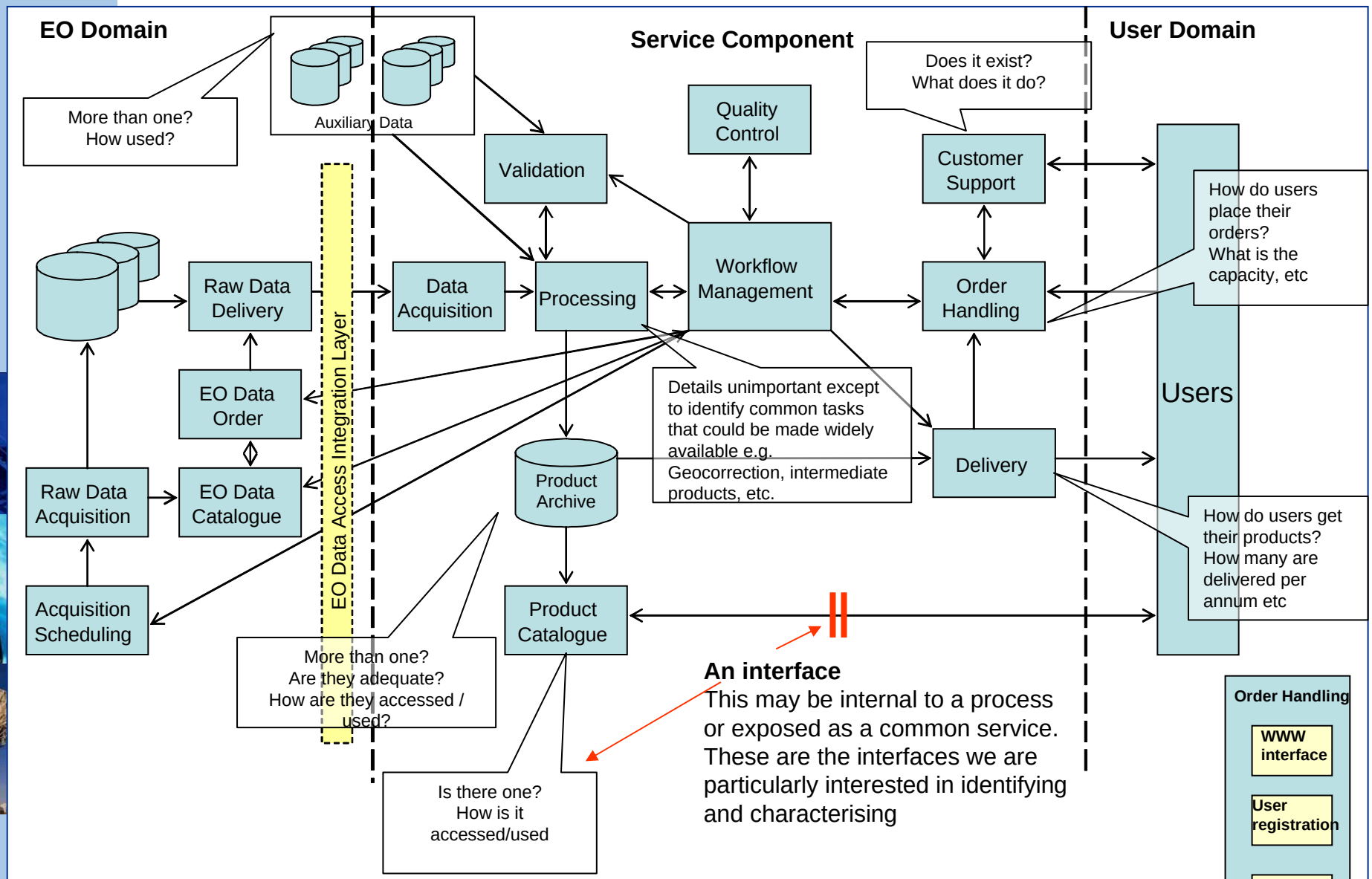
- distributed Service Oriented Architecture (SOA) component based system of systems
- generic & extensible
- standardisation of communications between elements
- based on the model of successful Internet B2B and B2C services

- Does NOT seek to define specific products
- Does NOT seek to restrict or mandate service deployment

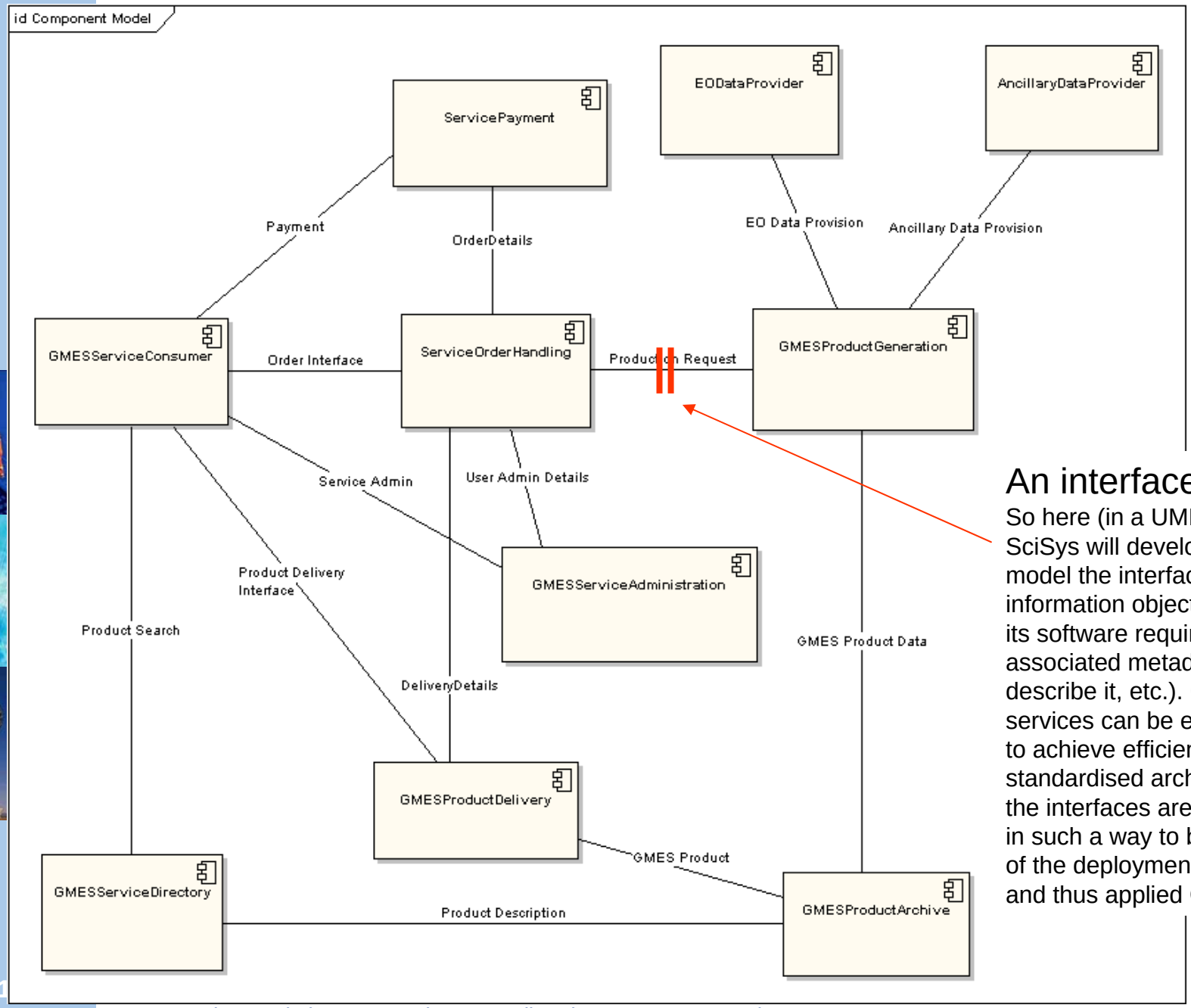


How does a GMES Service work?





A generic GMES Service functional diagram for a model based on data flows and relationships. Groups of services can contribute to the functions



An interface

So here (in a UML model that SciSys will develop) we can model the interface (the type of information object being moved, its software requirements, the associated metadata used to describe it, etc.). Common services can be exposed to all to achieve efficiencies in a standardised architecture where the interfaces are characterised in such a way to be independent of the deployment technology and thus applied GMES wide.

SOA Benefits

- Software Re-use and Interoperability
  - Between GMES Services
  - Standardisation of infrastructure interfaces
  - Improved Scalability
- Many Possible Deployment Architectures
- Rapid GMES Service Deployment
- Improved System Maintainability
- Protects Domain Specific Investment
  - Independence from Infrastructure Technology
  - Replaceable Infrastructure
- GMES Service Data Independent from System Implementation
  - Product Definition
- Potential for Generic Support Infrastructure
  - Product Delivery
  - Service templates and behaviour models

SOA is Already Here

- ESA have already invested in considerable technology development to prototype SOA for EO and other applications. – some examples :
- HMA
- MASS
- SSE
- The VOICE
- EGOS
- GDSS

Recent Developments

- GMES Bureau Established
- GSE Stage 2 in progress
- FTS Implementation Groups
  - Land
  - Marine
  - Emergency Response
- FTS Atmosphere (others?)
- BOSS4 KO
- INSPIRE Directive and draft Implementing Rules
- FP7 Call
- Debate on Downstream Services Funding
  - EC
  - End user / stakeholder engagement
- GEOSS Action Plan “Towards Convergence”
- Climate change debate (impacts)

Some Preliminary Messages

- Currently most GSE or IP provided services have, or are in the process of, developing their own streamlined architecture to reflect established supply chains. “Stove-piping”
- Consequently, GMES Service delivery is highly fragmented, many service networks with varying levels of service delivery and degrees of interoperability. What is and can be joined up.
- GSEs providing real services which users are interested in and taking on board. Adoption and acceptance levels are what might be expected at this stage in a service roll out programme for small groups and/or niche users – largely on the operations side.
- Most service providers appear to have sufficient throughput capacity (at least for now). Issues for service network expansion. Issues of service continuity / data gaps.
- Inconsistency in architecture designs at GSE and IP level. EC projects tend towards core services while the ESA projects indicate more downstream services. There is a need for more interaction between the two – discussion at collocation indicates situation changing
- Key component of GMES currently not mature enough is the architectural model to be applied to the Core service areas
- Issues of GMES governance and structure are still in development and under discussion, there is as yet no single vision of an overall GMES architecture – the “Vision Vacuum”.
- Any single GMES Service Architecture must recognise the need to integrate and build on the deployed Services providing an infrastructure to support the evolution of the existing systems into a system of systems. Recognise that specific functions will continue to be performed within the organisations that are best suited and equipped to provide these Services.
- Wide range of organisations, data and processing chains so the architecture to hold it together needs to be distributed, open and flexible. This will allow easy and standard mechanisms for data access and transfer between organisations and product delivery to users. Allows entry, growth and decline – evolution - of services

Current Status & Next Steps

- Initial report on present GMES service capabilities
  - GMES Service characteristics - complexity of service component
  - GSE, EC-IP, FTS + some information on mandated organisatons
    - Content and performance (e.g. scale, precision) of the information being provided
    - Service attributes for the information being provided (eg update times, response times, delivery times, validation, certification or endorsement with respect to user standards and working practices, coverage, throughput capacity, availability, cost) and assessment of the attainable service performance levels against defined user requirements
    - Key infrastructure on which service generation and delivery is based (eg data sources, models, data assimilation schema, service delivery infrastructure, service utilisation facilities within user organisations
    - Currently planned and funded upgrades to key infrastructure and on-going development activities and their impact on service enhancement
    - Present level of service utilisation, acceptance and adoption.
  - Derived status of infrastructure issues
    - Enterprise, Functional, Computational viewpoints
    - Indicative ideas on potential architecture – what would a realistic architecture for FTS look like
- ESA review
  - + GSE Collocation – need updated fresh information to inform system characterisation
  - + Updates from FTS IG development (GAC)
  - + Key users – revisit high level system requirements (e.g. EEA, EMSA, OCHA)
  - Consolidation of Phase 1 outputs
  - Recommendations on Phase 1
- Recommendations for Phases 2, 3

Communications

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